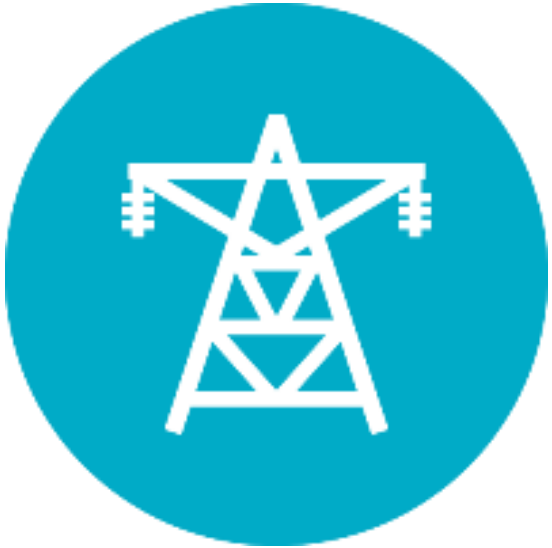
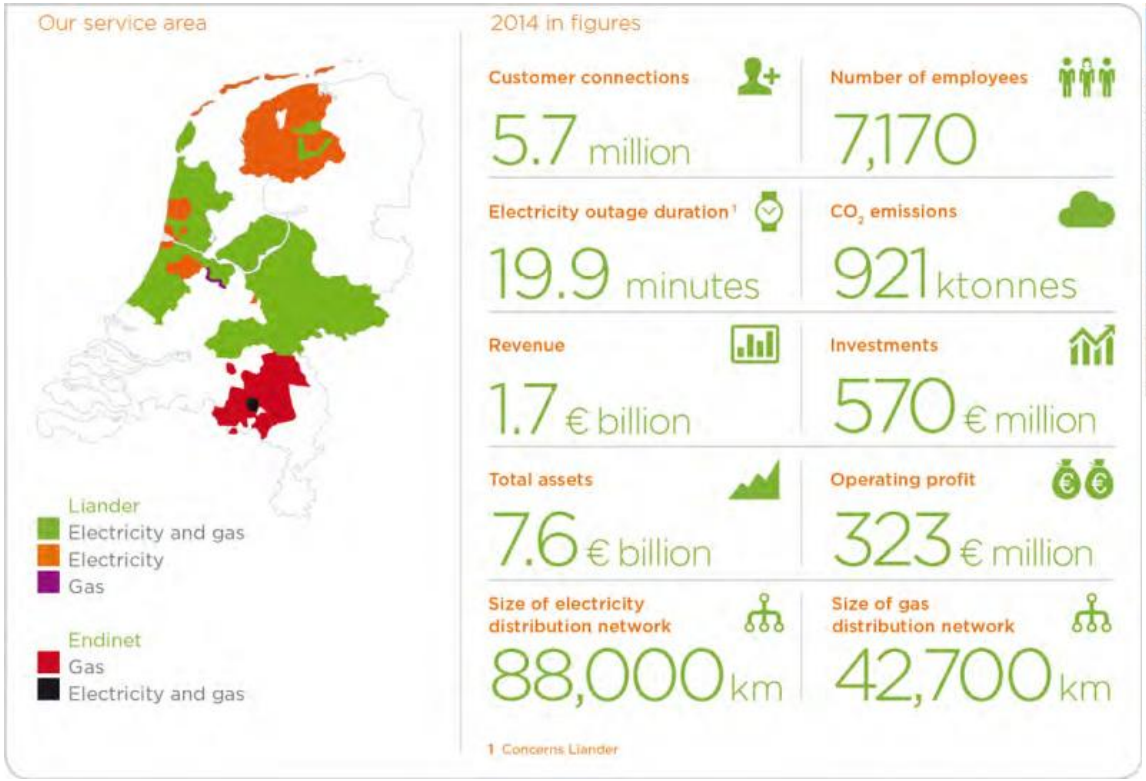


First steps to building real-time visualisations of Alliander's MV Grid using the PI ESRI ArcGIS Integrator

Presented by **Robin Hagemans & Gies Bouwman**
Alliander

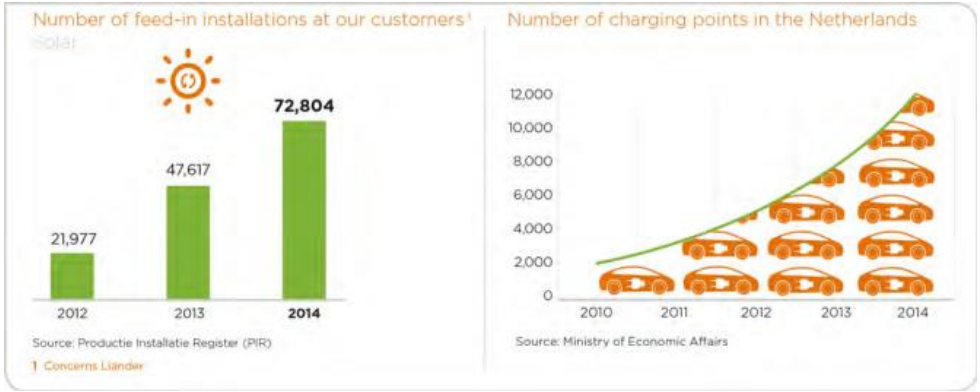
Introducing Alliander



alliander

MV grid: battlefield of Energy Transition

- ET puts challenges to distribution grid:
  - Supply vs. demand
  - PQ issues
  - Phase imbalance



- Number of sensor locations scaled x 100 ?

Challenge: infamiliarity with MV grid

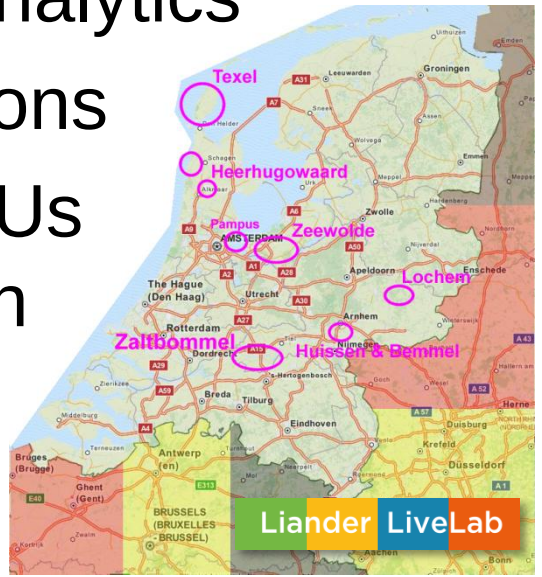
- Operator will broaden their view from HV to MV grid state
- Traditional topological schema reveals certain information
  - cable length
  - typology of environment

GIS visualisations in control room

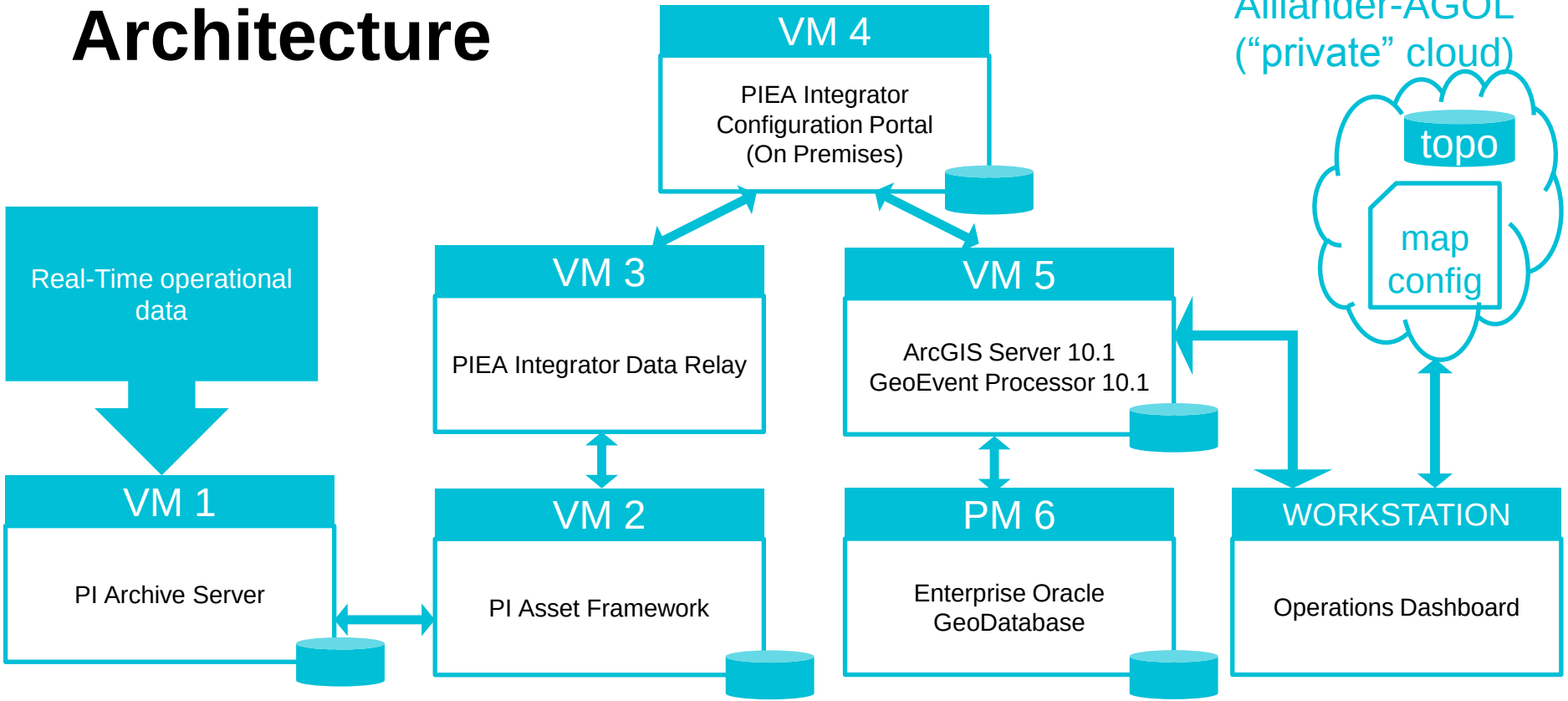
- 2014: GIS for MV outage management
  - Call-before-you-dig sites
  - Engineer vehicle positions
  - Geo feeds: trouble calls, social media, ..
- Towards grid-centric visualisations:
  - find optimum of topologic and geographic grid views
  - advanced RT analytics to prevent cognitive overload

Livelab innovation platform

- Alliander’s expertise center for smart grid innovations and analytics
- 60 secundary substations
- Variety of sensors, RTUs and telecommunication
- 6,500 PI tags



PI-ArcGIS Integrator Architecture



Demos

Demo 1: distributed generation

- Arrow direction: power flow
- Color: green for energy flowing towards substation
- Auxiliary, synchronized map offers context information
- Coresight widget to inspect trend data for selected feature

Demo 2: grid operation

- Line weight reflects current
- Possible alternatives:
  - as % of capacity
  - inbalance of phases
  - cos(φ) or power factor
  - one of above, max. over time period
- Transformer color for load and temperature
- Symbols for actual switch states

Demo 3: telecom status

- Modem signal strength and ping response time
- Extensible to service mgmt
  - battery voltage
  - RTU error codes
  - engineer vehicle locations
  - etc.

Lessons learned

- Stacked system architecture
  - efforts to keep it stable
- Geo and RT: separate worlds
  - different data models
  - different cultures
- PI & ArcGIS: nothing but enthousiastic reactions

Robin Hagemans

robin.hagemans@alliander.com
Manager Analytics, Innovations & Livelab
Alliander NV, The Netherlands

Gies Bouwman

gies.bouwman@alliander.com
Sr. System Engineer/Consultant
Alliander NV, The Netherlands

THANK YOU

Brought to you by